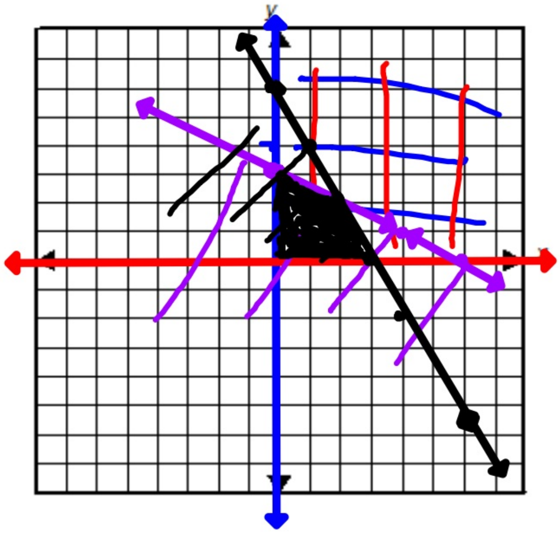
Bellwork:

Graph:

$$\begin{cases} 2x+4y\le 12 \\ x\ge 0 \\ y\ge 0 \\ y<-2x+6 \end{cases}$$



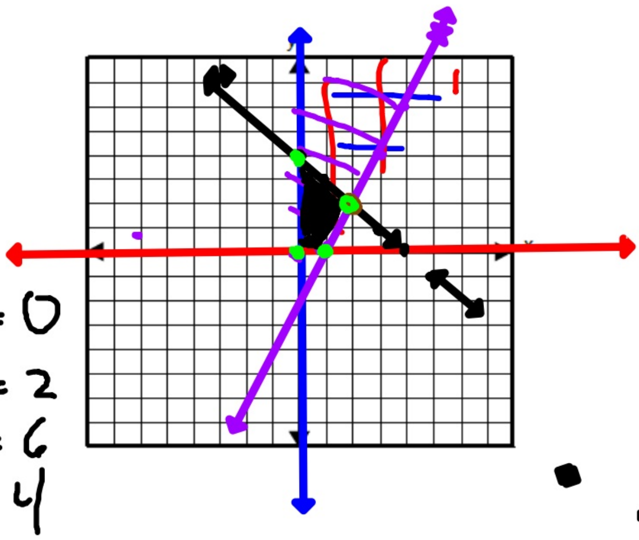
$2x+4y\le 12$

$\frac{4y}{4}\le\frac{-2x}{4}+\frac{12}{4}$

$y\le -\frac{1}{2}x+3$

Example 1. Find the maximum and minimum values of the objective function
P = 2x + y under the following constraints:

$$\begin{cases} y \geq 2x - 2 \\ y \leq -x + 4 \\ x \geq 0 \\ y \geq 0 \end{cases}$$



$P = 2x + y$

$(0,0)$ $2(0) + (0) = 0$

$(1,0)$ $2(1) + (0) = 2$

$(2,2)$ $2(2) + 2 = 6$

$(0,4)$ $2(0) + 4 = 4$

Example 2: Jim makes and sells gourmet food items. He makes two types of salad dressing, garlic and tofu. Each gallon of garlic dressing requires 2 quarts of oil and 2 quarts of vinegar. Each gallon of tofu dressing requires 3 quarts of oil and 1 quart of vinegar. Jim makes a $3 profit on each gallon of garlic dressing and a $2 profit on each gallon of tofu dressing. He has 18 quarts of oil and 10 quarts of vinegar on hand. How many gallons of each type of dressing should he make to maximize profits?

$P = 3g + 2t$

$g \geq 0$

$t \geq 0$

Oil	$2g$	$+ 3t$		≤ 18
Vinegar	$2g$	$+ 1t$		≤ 10

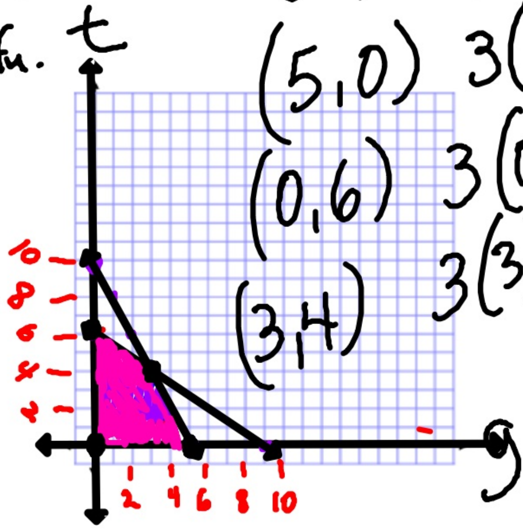
g = # of gallons garlic

t = # of gallons of tofu.

oil = $t \leq -\frac{2}{3}g + 6$

vinegar = $t \leq -2g + 10$

Jim should make 3 gallons of garlic and 4 gallons of tofu.



G T \$3g + \$2t

$(0,0)$ $3(0) + 2(0) = 0$

$(5,0)$ $3(5) + 2(0) = \$15$

$(0,6)$ $3(0) + 2(6) = \$12$

$(3,4)$ $3(3) + 2(4) = \$17$

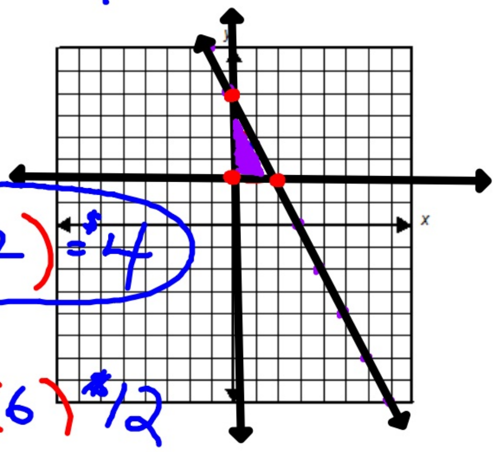
On graph paper do the following problems. Graph the constraints and darken the feasible region. Find the coordinates of the vertices. Find the maximum and minimum profit using these vertices and the given profit formula.

To minimize $x=0$ and $y=2$.

1. If cost is represented by $C = 2x + 2y$, find the minimum cost under these constraints:

$$\begin{cases} 2x + y \le 6 \\ x \ge 0 \\ y \ge 2 \end{cases}$$

; $y \le -2x+6$



(x, y)

$(0,2) = 2(0)+2(2) = \$4$

$(0,6) = 2(0)+2(6) = \$12$

$(2,2) = 2(2)+2(2) = \$8$

On graph paper do the following problems. Graph the constraints and darken the feasible region. Find the coordinates of the vertices. Find the maximum and minimum profit using these vertices and the given profit formula.

2. If profit is represented by $P = x + 3y$, find the maximum profit under these constraints:

$$\begin{cases} x + y \leq 5 \\ x + 2y \leq 8 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

On graph paper do the following problems. Graph the constraints and darken the feasible region. Find the coordinates of the vertices. Find the maximum and minimum profit using these vertices and the given profit formula.

3. If profit is represented by $P = 4x + y$, find the maximum profit under these constraints

$$\begin{cases} x + y \le 6 \\ 2x + y \le 10 \\ x \ge 0 \\ y \ge 0 \end{cases}$$

On graph paper do the following problems. Graph the constraints and darken the feasible region. Find the coordinates of the vertices. Find the maximum and minimum profit using these vertices and the given profit formula.

4. If cost is represented by $C = 2x + 3y$, find the minimum cost under these constraints:

$$\begin{cases} x + y \le 5 \\ x \ge 2 \\ y \ge 1 \end{cases}$$

Solve the following linear programming problem. Write the constraints and the objective equation. Find the maximum or minimum value.

5. Lois makes banana bread and nut bread to sell at a bazaar. A loaf of banana bread requires 2 cups flour and 2 eggs. A loaf of nut bread takes 3 cups flour and 1 egg. Lois has 12 cups flour and 8 eggs on hand. She makes a \$2 profit per loaf of banana bread and \$2 per loaf of nut bread. To maximize profits, how many loaves of each type should she bake?